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(71) Applicant (for all designated States except US): **DYSON LTD** [GB/GB]; Tetbury Hill, Malmesbury, Wiltshire SN16 0RP (GB).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **EVANS, Nicholas, Alexander** [GB/GB]; Link Cottage, St Mary Bourne, Andover, Hampshire SP11 6DB (GB).

(74) Agents: **CAGE, John, D.** et al.; Intellectual Property Department, Dyson Limited, Tetbury Hill, Malmesbury, Wiltshire SN16 0RP (GB).

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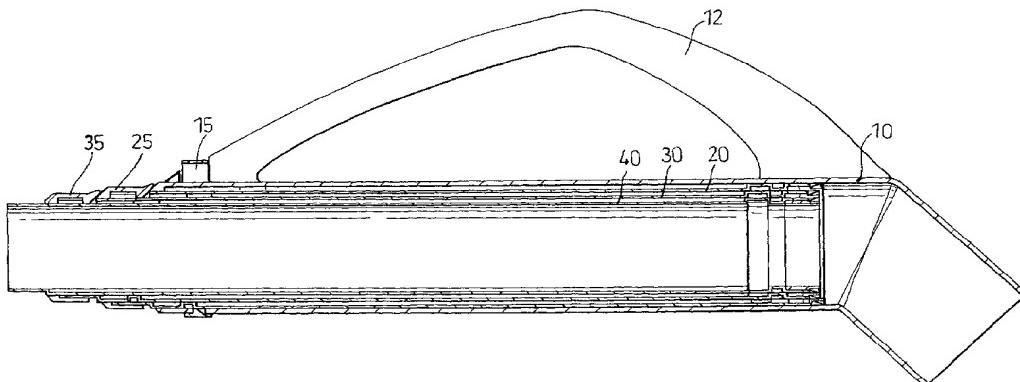
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(54) Title: WAND ASSEMBLY FOR A DOMESTIC APPLIANCE



(57) **Abstract:** A wand for a domestic appliance (e.g. vacuum cleaner) comprises a plurality of tubes (10, 20, 30, 40) which are dimensioned to telescope inside one another. Each tube (10, 20, 30, 40) is associated with a securing mechanism (15, 25, 35) for securing the tube in an extended position with respect to another of the tubes. Adjacent securing mechanisms (15, 25, 35) are positioned on their respective tubes such that, when the tubes are retracted, one securing mechanism presses against another to release the other securing mechanism. Thus, a user does not need to separately operate each securing mechanism (15, 25, 35) when extending the wand. Also, the tubes automatically secure themselves in an extended position with respect to one another. A hook (550) on the widest tube (10') cooperates with a collar (610) on the narrowest tube (40') to retain the tubes in a stored position.

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Wand Assembly for a Domestic Appliance

The invention relates to a telescopic wand assembly for a domestic appliance. The wand assembly is particularly, but not exclusively, useful for a vacuum cleaner.

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Cylinder vacuum cleaners generally comprise a main cleaner body which is dragged along by a user. The main body contains separating apparatus for separating dirt and dust from an airflow. Airflow is introduced to the main body via a hose and wand assembly which is manipulated by a user, a cleaning tool normally being attached to the 10 distal end of the wand. The hose and wand assembly comprises a length of flexible hose which is attached to the main body of the cleaner and a rigid wand. The wand typically has two tubes which are telescopically connected to one another. One of the tubes is rigidly connected to a handle and the other tube telescopes within that tube. Some form of locking device or ratchet mechanism is provided for securing the two 15 tubes in a particular position with respect to one another. In this way, the overall length of the wand is adapted to suit the physical dimensions (height or arm length) of the user. An example of this type of wand is shown in US 3,083,041.

There is a trend for vacuum cleaners to be made more compact so that they can be more 20 conveniently stored. While there have been many examples of cleaners with a compact cleaner body, most of these cleaners are still supplied with a bulky two-stage wand which is difficult to store during those times when the cleaner is not required. From a packaging point of view, the size of the wand often defines the minimum size of box which is required to ship the product.

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It is known to provide a wand with three stages. By providing a higher number of stages the overall length of the wand, when the wand has been fully collapsed, is shorter than with a two stage wand. However, the provision of a wand with three or more stages increases the complexity of the wand for a user. In particular, it can be more 30 time consuming and confusing to extend the wand for use and to retract the wand for storage.

The present invention seeks to provide a telescopic wand assembly which is more convenient to manipulate.

5 Accordingly, a first aspect of the present invention provides a wand for a domestic appliance comprising a plurality of tubes which are dimensioned to telescope inside one another, each tube being associated with a securing mechanism for securing the tube in an extended position with respect to another of the tubes, the securing mechanisms being arranged such that one securing mechanism releases another when the tubes are
10 retracted.

By providing securing mechanisms which operate one another, a user does not need to separately operate each individual securing mechanism to collapse the wand. Thus, a wand can be provided with a larger number of stages, which allows the wand to be
15 retract to a short overall length, without the additional complexity that such a wand would usually present for a user.

Preferably each securing mechanism is capable of moving between a locked position, in which it locks the tube to another tube and an unlocked position, in which it allows
20 movement between the tubes. Adjacent securing mechanisms are positioned on their respective tubes such that, when the tubes are retracted, one securing mechanism presses against another to unlock the other securing mechanism. Thus, there is no need for the securing mechanisms to be linked to one another, which would incur an inconvenient level of cost and complexity; rather, the securing mechanisms operate one
25 another in a mechanically simple and therefore reliable manner.

Preferably the securing mechanisms comprise a projection which locates in a depression on the outer surface of the tube to be locked. The depression can be formed by shaping the tube or by forming an aperture in the wall of the inner tube. The projection can be
30 carried by an arm which lies alongside the tube.

Preferably the arms are pivotally mounted about the tube. This causes the projections to move in a radial direction. The pivotal mounting of the arms can be achieved by manufacturing the arms from a material which is resiliently flexible (e.g. Nylon) or by providing each arm as a separate part which can pivot about the tube.

5

Preferably the surfaces of the securing mechanisms which, in use, press against one another are inclined with respect to the longitudinal axis of the wand whereby to effect the movement of the securing mechanisms.

10 It is also desirable that the securing mechanisms of the wand should automatically secure the tubes of the wand in an extended position as the wand is brought into an extended position, i.e. a user does not need to individually operate each securing mechanism in order to secure the tubes.

15 This can be achieved by providing a collar of increased diameter adjacent the end of a tube. The projection on the securing mechanism is, in use, temporarily displaceable by the collar whereby to accommodate and retain the collar within a cavity which is defined by the securing mechanism and tube. Alternatively, the projection can simply seat itself in a depression on the inner tube as the tubes are brought into the extended
20 position. The depression can be formed by shaping the tube or by forming an aperture in the wall of the inner tube.

25 Preferably the wand incorporates means for preventing rotation of the tubes with respect to one another. Thus, in use, a user will be able to control the position of a tool on the distal end of the wand. This can be achieved by providing a ridge which extends in an axial direction along the tube and a channel which extends in an axial direction along the securing mechanism.

30 Preferably one of the securing mechanisms is manually operable. A manually operated control can be provided on the widest of the tubes, i.e. the tube which accommodates all

of the other tubes when the wand is in a fully retracted state. Conveniently, the control can be located on, or adjacent to, a handle for manipulating the wand.

Preferably, one of the tubes comprises a plurality of alternative locking positions for 5 that tube with respect to another of the tubes. This allows a user to adjust the wand to suit their own physical requirements.

Preferably, the widest of the tubes comprises means for retaining the plurality of tubes in a stored position within the widest tube. This can take the form of a hook for 10 retaining a collar on the narrowest tube when the tubes are stored. The hook can be automatically operated as the tubes are moved towards the stored position.

Preferably the distal end of the narrowest tube comprises means for housing at least some of the securing mechanisms when the tubes are fully retracted. This can take the 15 form of a cap which houses the securing mechanisms.

A further aspect of the invention provides a wand for a domestic appliance comprising a plurality of tubes which are dimensioned to telescope inside one another, each tube being associated with a securing mechanism for securing the tube in an extended 20 position with respect to another of the tubes, the securing mechanisms being arranged such that each securing mechanism automatically secures the tubes in an extended position with respect to one another when the tubes are extended. Thus, a user does not need to individually operate each securing mechanism in order to secure the tubes in an extended position.

25 A further aspect of the invention provides a wand for a domestic appliance comprising a plurality of tubes which are dimensioned to telescope inside one another, and wherein the widest of the tubes comprises retaining means for cooperating with the narrowest of the tubes whereby to retain the plurality of tubes in a stored position within the widest 30 tube. Ordinarily, the locking arrangement on a two tube wand allows the two tubes to be locked in any position with respect to one another. Providing retaining means on the

widest tube for retaining the plurality of tubes in a stored position allows a simplified securing mechanism to be used on each of the tubes, i.e. a securing mechanism which only has to lock the tubes when the tubes are fully extended. The retaining means serves the function of retaining all of the tubes in a stored position.

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Preferably the narrowest of the tubes comprises a collar and the widest of the tubes comprises a locking mechanism which has a hook for retaining the collar on the narrowest tube when the tubes are stored.

- 10 Preferably the retaining means is automatically operated as the tubes are moved towards the stored position such that a user does not need to operate the retaining means.

- 15 Preferably each tube is associated with a securing mechanism for securing the tube in an extended position with respect to another of the tubes and the distal end of the narrowest tube comprises means for housing at least some of the securing mechanisms when the tubes are fully retracted. This protects the securing means from damage during storage. The securing means may comprise a cap having a longitudinally extending wall defining a cavity for housing the securing mechanisms.
- 20 It will be appreciated that these further aspects of the invention can be combined with any of the described/claimed features of the other aspects of the invention.

- 25 These arrangements are particularly useful for cylinder or canister type cleaners. However, they can also be used on other types of vacuum cleaners or on other domestic appliances in general, such as a carpet shampooing machine.

An embodiment of the invention will now be described with reference to the accompanying drawings, wherein:

- 30 Figures 1 and 2 show a wand according to the present invention in an extended state;

Figure 3 shows the wand of Figure 1 in a retracted state;

Figure 4 is a cross-section through the wand of Figure 3;

5 Figure 5 is a detailed cross-section through a part of the wand of Figure 1, when the wand is locked in an extended state;

Figure 6 is a further view of parts of the wand shown in the cross-section of Figure 5;

10 Figure 7 is a detailed cross-section through another part of the wand of Figure 1;

Figures 8 and 9 show the locking mechanism on the storage tube of the wand of Figure 1;

15 Figure 10 shows part of the locking mechanism of Figures 8 and 9 in more detail;

Figure 11 shows an alternative embodiment of the locking mechanism of Figures 8 – 10;

20 Figure 12 shows an alternative embodiment of the wand locked in an extended state;

Figure 13 is a more detailed view of parts of the embodiment shown in Figure 12;

25 Figures 14 and 15 show an alternative embodiment for the locking mechanism on the storage tube of the wand;

Figures 16 and 17 show a wand with the locking mechanism shown in Figures 14 and 15;

30 Figure 18 shows the wand of Figures 16 and 17 in a fully retracted and locked state;

Figures 19 and 20 show, in more detail, tubes of the wand being brought into a locked state; and,

Figure 21 shows a further alternative embodiment of a securing mechanism for the

5 wand.

The wand comprises three separate tubes 20, 30, 40 of progressively decreasing diameter such that they telescope inside one another. The three tubes are retractably housed in a storage tube 10. A handle 12 is connected to storage tube 10 to allow a user 10 to manipulate the wand. A flexible hose 18 extends from section 16 of the storage tube 10 and is connected to the tube by a rotating joint 17.

The tubes 20, 30, 40 are slideable inside one another and can be moved between a stored position (as shown in Figures 3 and 4) and an extended position (as shown in

15 Figures 1 and 2) in which one tube is extended from another such that only the ends of the tubes overlap one another. Figure 4 is a cross section along the line A – A in Figure 3 showing the tubes in a fully retracted position within storage tube 10. Tubes 20, 30, 40 are progressively narrower in diameter and longer in length. The length of each tube is chosen so that it fully occupies the available length of the storage tube 10 when the 20 securing mechanisms 25, 35 are lying alongside one another.

The distal end of tube 40 is adapted to receive a floor tool (not shown) in any known manner. For example, the floor tool can be connected to the tube 40 by means of an

25 interference fit, interconnecting bayonet fittings, snap-fit connections, a screw threaded collar and sleeve, or by any other suitable means. Accessory tools may also be fitted to the tube 40 in place of the floor tool.

Securing mechanisms 15, 25, 35 are capable of either locking the tubes to one another, as is needed when the tubes are in an extended position, or allowing free movement of

30 the tubes with respect to one another, as is needed when the tubes are being retracted. A securing mechanism 15 is provided on storage tube 10 to secure tube 20 to storage tube

10. Another securing mechanism 25 is provided at the distal end of tube 20 for securing tube 20 to tube 30 and a further securing mechanism 35 is provided at the distal end of tube 30 for securing tube 30 to tube 40.

5 Figure 5 shows the securing mechanism 25 on tube 20 in more detail and Figure 6 shows an alternative view of the securing mechanism 25 and the end of tube 20. The securing mechanism 35 on tube 30 works in the same manner. The securing mechanism 25 comprises a ring which fits around the outside of tube 20. A first annular portion 251 of the ring 250 projects forwardly from the end of the tube 20 and forms an opening which has a narrower diameter than that of tube 20 itself. This allows the ring to remain in position on tube 20. The diameter of the opening in annular portion 251, while narrower than tube 20, is wide enough to receive tube 30. The first annular portion 251 has an inclined forward surface 252. Axially rearwardly of the first annular portion 251 is a second annular portion. The second annular portion comprises a plurality of arms (shown generally as 259 in Figure 6) which are connected to, and extend axially rearwardly from, the first annular portion 251. Between each arm 259 is an arc-shaped part 258 which fits alongside the outer surface of the tube 20. The arc-shaped parts 258 are also connected to the first annular portion 251 and extend axially rearwardly for a shorter distance than the arms. The arc-shaped parts 258 and the arms 259 are 10 circumferentially separated by a narrow gap 257. Three arms 259 are shown, which has been found to be a preferred minimum number, but other numbers of arms 259 can be provided. Each of the arms 259 have a radially inwardly extending projection 254 which locates within an aperture 263 in the wall of the tube 20. When the tubes are in locked position as shown, projection 254 also locates in depression 314 on tube 30 so as 15 to lock the tubes 20, 30 together. The arms 259 also have a radially outwardly extending portion 255 with an inclined face 256. The projection 255 is pivotable about the annular portion 251 and the securing mechanism is manufactured from a material which is sufficiently resilient to permit it to flex outwardly and return to the position shown without breaking. To release the tubes 20, 30, the arms 259 flex radially 20 outwardly, pivoting about the annular portion 251. This carries the arm 259 sufficiently radially outwardly such that the projection 254 lies radially outside the depression in the 25

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tube and outside the collar 310. The interior surface 266 of each arm 259 has a concave profile which allows the arm to be readily gripped by a user, should this be necessary. The securing mechanism 25 also has a further set of projections 265. These are retaining features which locate in corresponding apertures 264 on tube 20. The end of 5 tube 30 comprises a collar 310 which has a larger diameter compared to the remainder of the tube 30 to the left of the collar. The collar 310 serves to retain the tube 30 within tube 20 when it is trapped between annular portion 251 and projection 254. Annular portion 314 has a narrower diameter than collar 310 and provides a depression to receive projection 254 of the securing mechanism. Collar 310 can be formed by 10 shaping tube 30, as shown in Figure 5, by increasing the thickness of the tube or by securing an additional ring of material around the tube at the place where the collar is required. The rearmost annular portion 312 of tube 30 is shown here as having the same diameter as the collar 310. This is preferable, since portion 312 presses against the adjacent wall of tube 20 and serves to stabilise the tubes and it also allows seal 260 to be 15 supported close to the inner wall of tube 20. However, annular portion 312 could have the same diameter as the remainder of tube 30.

A seal 260 is provided on each tube for sealing against another tube. The seal 260 is located at one end of tube 30 and is secured to the inner surface of the tube. The seal 20 260 can be bonded or clipped in place.

The seal 260 extends axially and radially beyond the end of the tube such that it can seal against the inner surface of the larger tube 20. The axially end-most portion of tube 20 has a narrower diameter than the remainder of the tube such that seal 260 can fit well 25 against the interior surface of tube 20. The transition in diameter to the narrower end diameter is shown as portion 220 of the tube.

Figures 7 to 9 show the securing mechanism on storage tube 10 in more detail. For clarity, only release catch 15 and tube 20 (the tube that the catch 15 acts on) are shown. 30 Release catch 15 comprises a ring shaped member 155 having a portion 151 which extends outside the housing of storage tube 10 and which can be manually operated to

release the catch. Release catch 15 is supported (not shown) by tube 10 such that it can move in a plane which is perpendicular to the longitudinal axis of tube 10. The active part of the catch is a projection 152 which extends radially inwardly from the ring member 155. As shown in Figure 9, when tube 20 is fully withdrawn from storage tube 10 projection 152 locates in a channel 156 on the outer surface of tube 20 and serves to lock the tubes in this position. A notch 154 in the projection 152 accommodates ridge 22 and serves to prevent the tubes from twisting with respect to one another. The forward-most portion of storage tube 10 has an inclined face 102 and a diameter which is narrower than both tube 10 and collar 110 of tube 20. Thus, tube 20 cannot be withdrawn from storage tube 10 beyond collar 110. Inclined face 102 serves to unlock securing mechanism 25 when the tubes are collapsed, as will be described more fully below. Seal 210 seals tube 20 to storage tube 10.

It is preferred that the tubes should not twist with respect to one another. An axially extending ridge 22 is provided along the outer surface of each tube 20, 30, 40. Each securing mechanism has a channel (267, Figure 6) which can accommodate the ridge. In use, the ridge 22 slides within the channel 267 as the tubes slide within one another but the channel 267 prevents any rotational movement. The ridge 22 can be formed as an extrusion along with the tube.

It is preferable for the wand to be lockable with a range of different overall lengths such that users who differ in their physical dimensions (height, arm length) can comfortably use the wand. To satisfy this requirement, the uppermost tube 20 is provided with a set of locking positions 230, as shown in Figure 11. Conveniently, these locking positions are provided as notches 230 in the ridge 22 which runs along the length of tube 20. For this embodiment the release catch 15 does not have the notch 154 as shown in Figure 10. Rather, projection 152 is continuous so as to locate in one of the locking position notches 230.

The tubes can be manufactured from a metal such as steel or aluminium, or even a robust plastic material. The tubes are preferably formed from a material of constant

thickness, the ridges and channels being formed by shaping the tube. This has the advantage of minimising the weight of the finished product.

In the above embodiment, the securing mechanisms are manufactured from a resiliently flexible material such as a nylon compound. However, an equivalent pivotal movement of the arms can be achieved by manufacturing each arm as a separate part and providing a pivot between each arm and the remainder of the securing mechanism. The resilience of the arm can be achieved by mounting a spring between the arm and the tube or between the arm and a fixed part of the securing mechanism.

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While the above described embodiments show the securing mechanisms 25, 35 as being a separate part from the tubes, a securing mechanism could be manufactured integrally with a tube. A plastic securing mechanism could be moulded (or otherwise formed) around a metal tube, or a plastic securing mechanism could be moulded (or otherwise formed) with a plastic tube.

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The operation of the wand will now be described. To extend the wand, a user holds storage tube 10 by handle 12 and pulls the narrowest tube 40 axially away from the storage tube 10. Each of the tubes 20, 30, 40 slides outwardly from the storage tube 10.

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The order in which the tubes slide out of the storage tube 10 is determined by the friction which exists between the tubes and is unimportant. As each tube reaches an extended position with respect to another tube, for example, as tube 30 slides towards the position with respect to tube 20 shown in Figure 5, the tubes automatically lock in this position. Referring to Figure 5, projection 254 of the securing mechanism 25 is forced radially outwardly as inclined face 256 rides over collar 310 on tube 30.

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Projection 254 eventually reseats itself in depression 314 on tube 30. Tube 30 is prevented from sliding any further outwards by annular portion 251 of the securing mechanism. Collar 310 on tube 30 is now securely held between the vertical faces of the annular portion 251 and projection 254 and cannot move in either longitudinal direction. Thus, tube 30 is now locked with respect to tube 20. Seal 260 seals against the inwardly tapered portion 220 of tube 20. Tube 40 locks with respect to tube 30 in a

similar manner. Once the tubes have all locked, the wand is ready for use. It will be appreciated that each of the tubes locks in an extended position in an automatic fashion without requiring a user to separately operate a securing mechanism on each tube.

5 The procedure for collapsing the wand will now be described. A user firstly operates release catch 15 on storage tube 10. This releases the catch from tube 20. A user pushes the distal end of tube 40 axially towards the tube 10. This causes tube 20 to slide within storage tube 10. Once tube 20 has been fully retracted inside the storage tube 10 the securing mechanism 25 pushes against the leading edge 102 of the storage
10 tube 10 (as shown in Figure 4) and causes the arms of the securing mechanism 25 to flex radially outwardly, thus unlocking tube 30 from tube 20. Tube 30 then retracts inside the storage tube until securing mechanism 35 pushes against securing mechanism 25. As before, this causes the arms of the securing mechanism to flex radially outwardly so as to unlock tube 40 from tube 30. As a user continues to push tube 40,
15 tube 40 retracts inside storage tube 10 and the wand is thus fully retracted. The complete wand retraction can be performed in one continuous, swift movement without the need for a user to separately operate each securing mechanism 25, 35.

Figures 12 and 13 show an alternative embodiment of the wand, using similar views to those shown in Figures 5 and 6. As before, tubes 20' and 30' represent two adjacent stages of the wand. The main difference in this embodiment is that the collar 310 of tube 30 in Figure 5 has been replaced by an inclined surface 470 and the projection 254 of Figure 5 has been replaced by a projection 454 having a straight, radially extending face on both sides rather than an inclined surface on one of its sides. This alternative arrangement achieves the same function as the previous one in that, as the tube 30' is extended towards the locked position, projection 454 is moved radially outwards. Here, the movement is achieved by the inclined face 470 of tube 30' cooperating with projection 454. Figures 18 and 19 compare the two embodiments in more detail.

30 There are several other differences in the embodiment shown in Figure 12. Tube 30' has an aperture 414 stamped in it rather than a shaped depression in the outer surface of

the tube. This has been found to be simpler to manufacture. To compensate for the fact that tube 30' now has an aperture in its outer wall, seal 460 extends further, in a longitudinal direction, into the tube 30'. It can be seen that the innermost part of seal 460 abuts both the inner wall of the inclined surface 470 of tube 30' and the outermost 5 part 462 of seal 460 abuts the inner wall of tube 20'. In use, projection 454 seats itself in aperture 414 when the tubes are locked. Movement of tube 30' in either longitudinal direction is prevented by virtue of the radial faces of projection 454. This arrangement has been found to provide the user with a more positive indication of when the tubes are 10 locked compared with the arrangement described earlier.

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Figures 14 and 15 show an alternative locking mechanism 500 for the storage tube 10, shown here as 10'. Figure 14 shows the widest tube 20', in an extended and locked position with respect to the storage tube 10'. The locking mechanism 500 comprises an actuator member 510 and a locking lever 560. Actuator member 510 is pivotally mounted about pivot 520 to the storage tube 10' and locking lever 560 is pivotally mounted about pivot 540 to another part of the storage tube 10'. Actuator member 510 carries a rib 515 which presses against an inclined surface 535 of the locking lever 560. In use, movement of the actuator member 510 in the direction shown as 580 causes the 15 rib 515 to ride along the inclined surface 535, causing the locking lever 560 to raise or lower in the direction shown as 585. Projection 530 on the locking lever 560 seats in a depression 590 in the wall of tube 20' to lock the position of tube 20'. Operating the actuator member 510 allows the projection 530 to be raised from its seated position and thus allows tube 20' to be retracted. Locking lever 530 also carries a hook 550 which 20 can retain a collar 610 on a cap 600 on the distal end of tube 40'. When all of the tubes have been retracted into the storage tube 10', cap 600 lies alongside the end of storage 25 tube 10' and hook 550 can hook over collar 610. All of the tubes 20', 30', 40' are held securely within storage tube 10' until the actuator member 510 is operated to release the hook 550. The leading edge of hook 550 comprises an inclined face 551 which can be displaced by collar 610 as the tubes are retracted inside the storage tube 10'. This 30 allows the hook 550 to automatically ride over the collar 610 and thus retain the cap 600 as the tubes are moved towards a stored position (shown in Figure 18). It will be

appreciated that collar 610 could be provided as part of tube 40' rather than as part of a separate fitting 600. In the stored position, cap 600 accommodates all of the securing mechanisms of the other stages, and thus serves to protect them from damage during storage.

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The locking arrangement just described can work in the same manner as the arrangement just shown in Figure 11 so as to allow the tube 20' to be locked in various extended positions. Uppermost tube 20' would be provided with a set of locking depressions of the type shown as 590 in Figure 14. These locking positions can be 10 provided as further notches 590 in the ridge 595 which runs along the length of tube 20'.

Figure 21 shows a further alternative embodiment for a securing mechanism for the tubes. Here, the arms 259, 459 of the previous embodiments have been replaced by a 15 locking part 700 which is movable in a radial direction. Locking part 700 is retained by a rearwardly extending rib 745 of a ring 740 which fits around tube 20'. A spring 750 acts between rib 745 and the locking part 700 and serves to bias the locking part 700 towards tube 30'. This embodiment works in the same manner as those described previously, and automatically assumes both a locked position and an unlocked position 20 without manual operation by a user. In use, the inclined leading edge 741 of the collar 740 on one locking mechanism will press against the inclined surface 710 of an adjacent locking mechanism so as to automatically unlock tubes. Locking part 700 is shown with a square projection 720 but it could have an inclined face of the type shown in Figure 19.

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The wand which is shown in the drawings has three separate tubes or stages, in addition to a storage tube, but it will be appreciated that the wand could have only two stages or a higher number than three. Each additional stage would have the same type of securing mechanism as the ones shown as 25, 35 in the illustrated embodiment. While the 30 handle has been shown as part of the storage tube, the handle could be an elbow-shaped

pipe which fits inside the distal end of the storage tube, in place of section 16 shown in Figure 1.

Claims

1. A wand for a domestic appliance comprising a plurality of tubes which are dimensioned to telescope inside one another, each tube being associated with a securing mechanism for securing the tube in an extended position with respect to another of the tubes, the securing mechanisms being arranged such that one securing mechanism releases another when the tubes are retracted.
5
2. A wand according to claim 1 wherein each securing mechanism is capable of moving between a locked position, in which it locks the tube to another tube, and an unlocked position, in which it allows movement between the tubes, adjacent securing mechanisms being positioned on their respective tubes such that, when the tubes are retracted, one securing mechanism presses against another to unlock the other securing mechanism.
10
3. A wand according to claim 2 wherein the surfaces of the securing mechanisms which, in use, press against one another are inclined with respect to the longitudinal axis of the wand whereby to effect movement of the securing mechanisms.
15
4. A wand according to claim 2 or 3 wherein the securing mechanism comprises a projection which, in the locked position, is arranged to locate in a depression on the outer surface of said another tube.
20
5. A wand according to claim 2, 3 or 4 wherein the securing mechanism comprises a projection and wherein the projection and the tube define a cavity which, in the locked position, is arranged to retain a collar on the said another tube.
25
6. A wand according to claim 4 or 5 wherein the projection is carried by an arm which lies alongside the tube, the arm being movable by pressing against another securing mechanism.
30

7. A wand according to claim 6 wherein the arms are pivotally mounted about the tube, the projection being movable in a radial direction.

8. A wand according to claim 7 wherein the surfaces of the securing mechanisms which, in use, press against one another are inclined with respect to the longitudinal axis of the wand whereby to effect the radial movement of the arms.

9. A wand according to any one of claims 4 to 8 wherein there are a plurality of arms which are circumferentially spaced around the tube.

10

10. A wand according to claim 9 wherein there are at least three arms.

11. A wand according to any one of claims 6 to 10 wherein the arms are supported by a support collar which fits around the tube.

15

12. A wand according to claim 11 wherein the arms and the support collar are formed integrally with one another from a material which is resiliently flexible.

20

13. A wand according to any one of the preceding claims wherein the tube has means for preventing rotation of the tubes with respect to one another.

14. A wand according to claim 13 wherein the rotation preventing means comprises a ridge which extends in an axial direction along the tube and a channel which extends in an axial direction along the securing mechanism.

25

15. A wand according to any one of the preceding claims wherein each tube carries a seal for sealing with another tube.

30

16. A wand according to claim 15 wherein the seal is located within the tube at one end thereof.

17. A wand according to claim 15 or 16 wherein the seal is arranged to seal against a narrowed end portion of another tube.

18. A wand according to any one of the preceding claims wherein one of the
5 securing mechanisms is manually operable.

19. A wand according to claim 18 wherein the manually operable securing mechanism forms part of the widest tube.

10 20. A wand according to claim 19 wherein the widest tube further comprises a handle for manipulating the wand and the manually operable securing mechanism is located on or adjacent to the handle.

15 21. A wand according to any one of the preceding claims wherein one of the securing mechanisms is able to secure the wand in a range of different extended positions.

20 22. A wand according to claim 21 wherein one of the tubes comprises a ridge which extends in an axial direction along the tube, the ridge having a plurality of indentations along its length, the securing mechanism comprising a lug for seating in a selected one of the indentations.

25 23. A wand according to any one of the preceding claims wherein the widest of the tubes comprises means for retaining the plurality of tubes in a stored position within the widest tube.

24. A wand according to claim 23 wherein the narrowest of the tubes comprises a collar and the widest of the tubes comprises a locking mechanism which has a hook for retaining the collar on the narrowest tube when the tubes are stored.

25. A wand according to claim 23 or 24 wherein the retaining means is automatically operated as the tubes are moved towards the stored position.

26. A wand according to any one of the preceding claims wherein the distal end of
5 the narrowest tube comprises means for housing at least some of the securing mechanisms when the tubes are fully retracted.

27. A wand according to any one of the preceding claims wherein the securing mechanisms are also arranged such that each securing mechanism automatically secures
10 the tubes in an extended position with respect to one another when the tubes are extended.

28. A wand according to claim 27 wherein each securing mechanism comprises a projection which is capable of moving into a locked position, in which it locates in a
15 depression on the outer surface of another tube.

29. A wand according to claim 27 or 28 wherein each securing mechanism comprises a projection and said another tube comprises a collar of increased diameter adjacent its end, the tube and the securing mechanism defining a cavity for receiving the
20 collar of said another tube, the projection being temporarily displaceable by the collar when the tubes are moved into an extended position with respect to one another whereby to accommodate and retain the collar within the cavity.

30. A wand according to any one of claims 27 to 29 wherein the securing mechanisms or the tubes have an inclined face which is capable of temporarily moving
25 the securing mechanism as the tubes are brought into an extended position.

31. A wand according to any one of the preceding claims wherein the securing mechanisms are located on the outer walls of the tubes.

32. A wand for a domestic appliance comprising a plurality of tubes which are dimensioned to telescope inside one another, each tube being associated with a securing mechanism for securing the tube in an extended position with respect to another of the tubes, the securing mechanisms being arranged such that each securing mechanism automatically secures the tubes in an extended position with respect to one another when the tubes are extended.

5
33. A wand according to claim 32 wherein each securing mechanism comprises a projection which is capable of moving into a locked position, in which it locates in a depression on the outer surface of another tube.

10
34. A wand according to claim 32 or 33 wherein each securing mechanism comprises a projection and said another tube comprises a collar of increased diameter adjacent its end, the tube and the securing mechanism defining a cavity for receiving the collar of said another tube, the projection being temporarily displaceable by the collar when the tubes are moved into an extended position with respect to one another whereby to accommodate and retain the collar within the cavity.

15
20
35. A wand according to any one of claims 32 to 34 wherein the securing mechanisms or the tubes have an inclined face which is capable of temporarily moving the securing mechanism as the tubes are brought into an extended position.

25
36. A wand for a domestic appliance comprising a plurality of tubes which are dimensioned to telescope inside one another, and wherein the widest of the tubes comprises retaining means for cooperating with the narrowest tube whereby to retain the plurality of tubes in a stored position within the widest tube.

30
37. A wand according to claim 36 wherein the narrowest of the tubes comprises a collar and the widest of the tubes comprises a locking mechanism which has a hook for retaining the collar on the narrowest tube when the tubes are stored.

38. A wand according to claim 36 or 37 wherein the retaining means is automatically operated as the tubes are moved towards the stored position.

39. A wand according to any one of claims 36 to 38 wherein each tube is associated
5 with a securing mechanism for securing the tube in an extended position with respect to another of the tubes, and wherein the distal end of the narrowest tube comprises means for housing at least some of the securing mechanisms when the tubes are fully retracted.

40. A wand according to claim 39 wherein the housing means comprises a cap
10 having a longitudinally extending wall defining a cavity for housing the securing mechanisms.

41. A wand according to any one of the preceding claims in the form of a cleaning wand for a vacuum cleaner.

15 42. A domestic appliance incorporating a wand according to any one of the preceding claims.

43. A wand for a domestic appliance substantially as described herein with reference
20 to the accompanying drawings.

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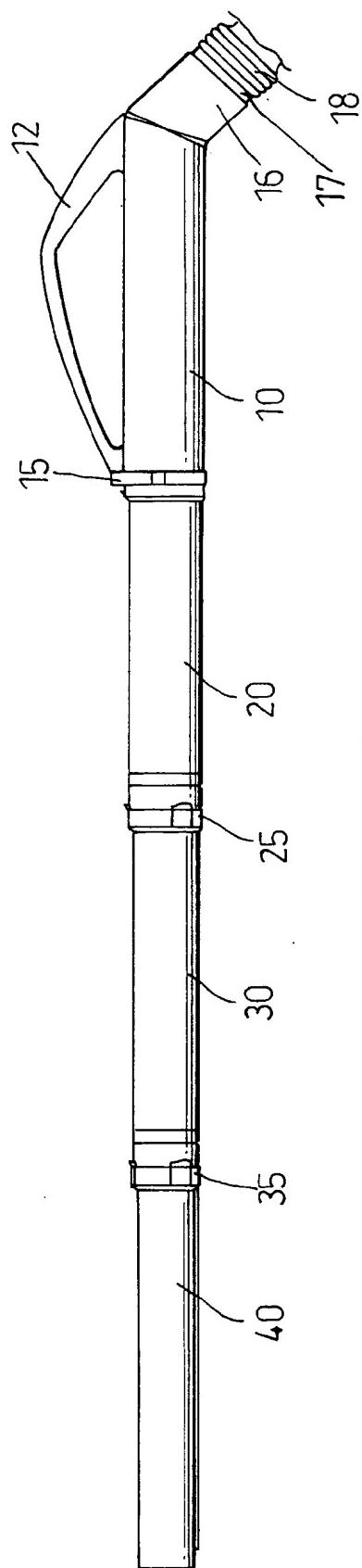


Fig. 1

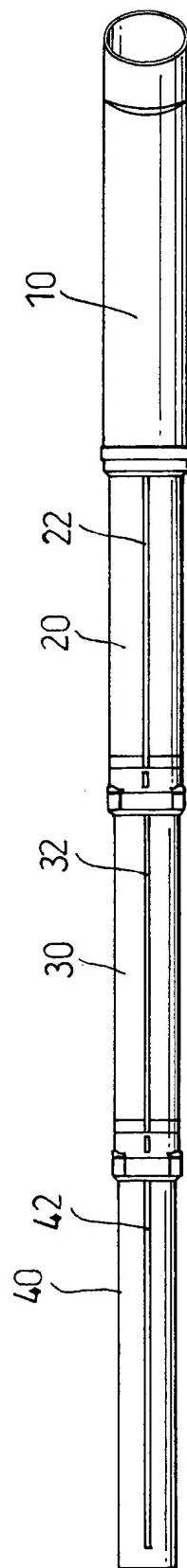


Fig. 2

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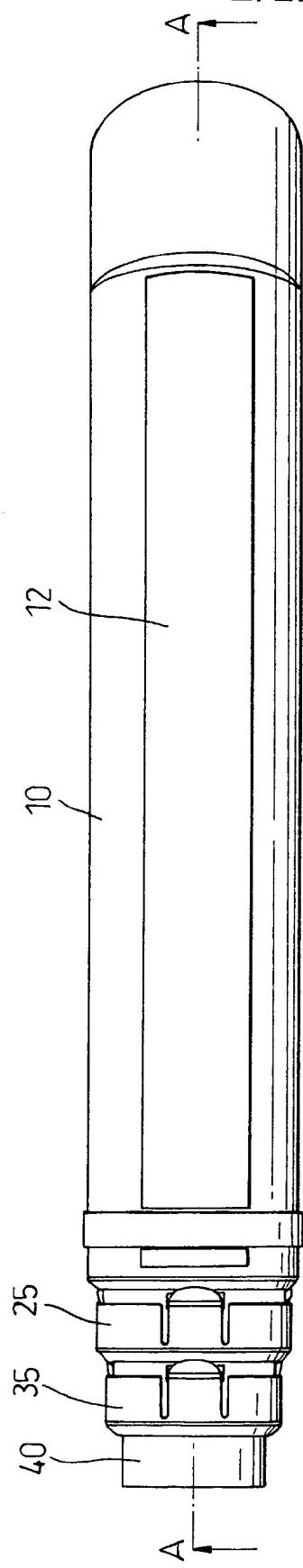


Fig. 3

SUBSTITUTE SHEET (RULE 26)

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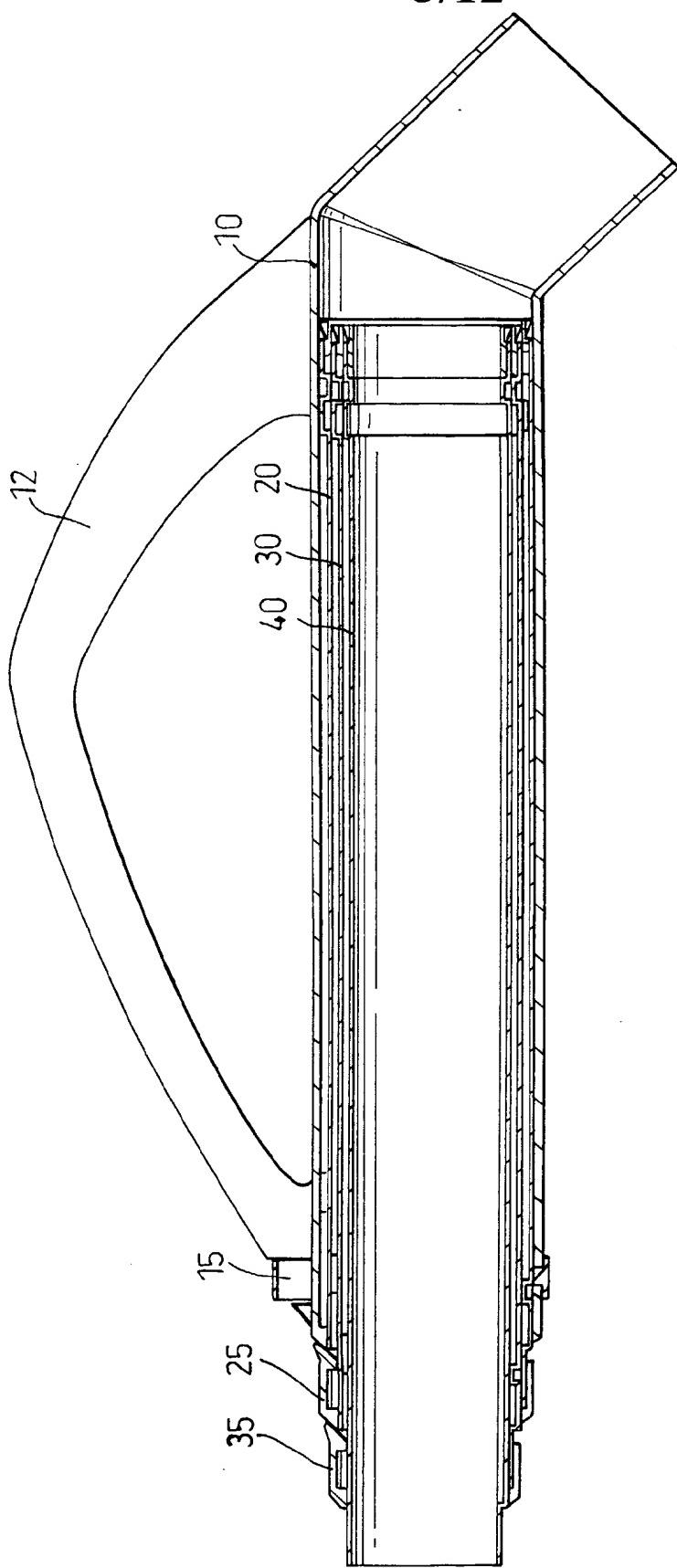


Fig. 4

SUBSTITUTE SHEET (RULE 26)

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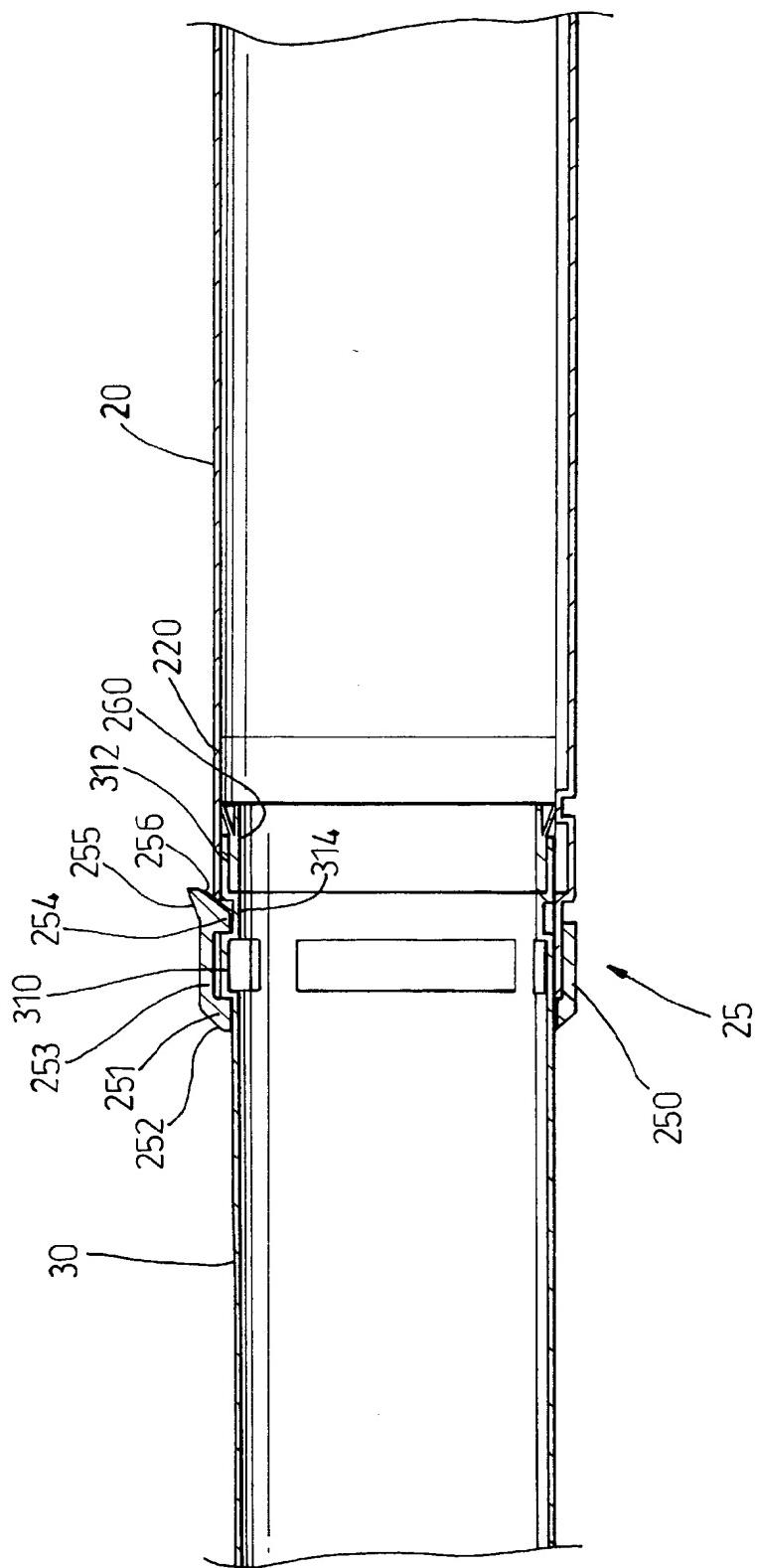


Fig. 5

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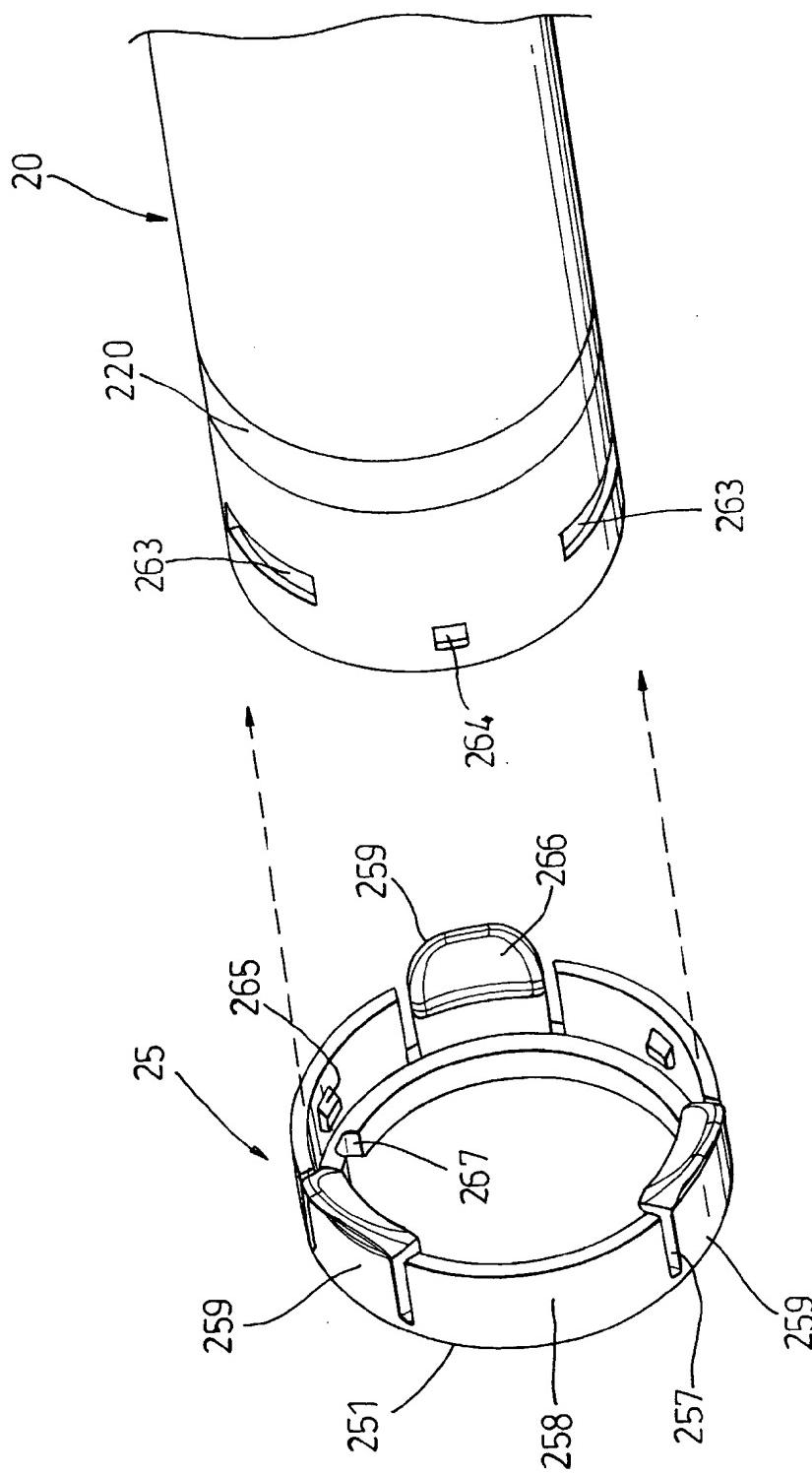
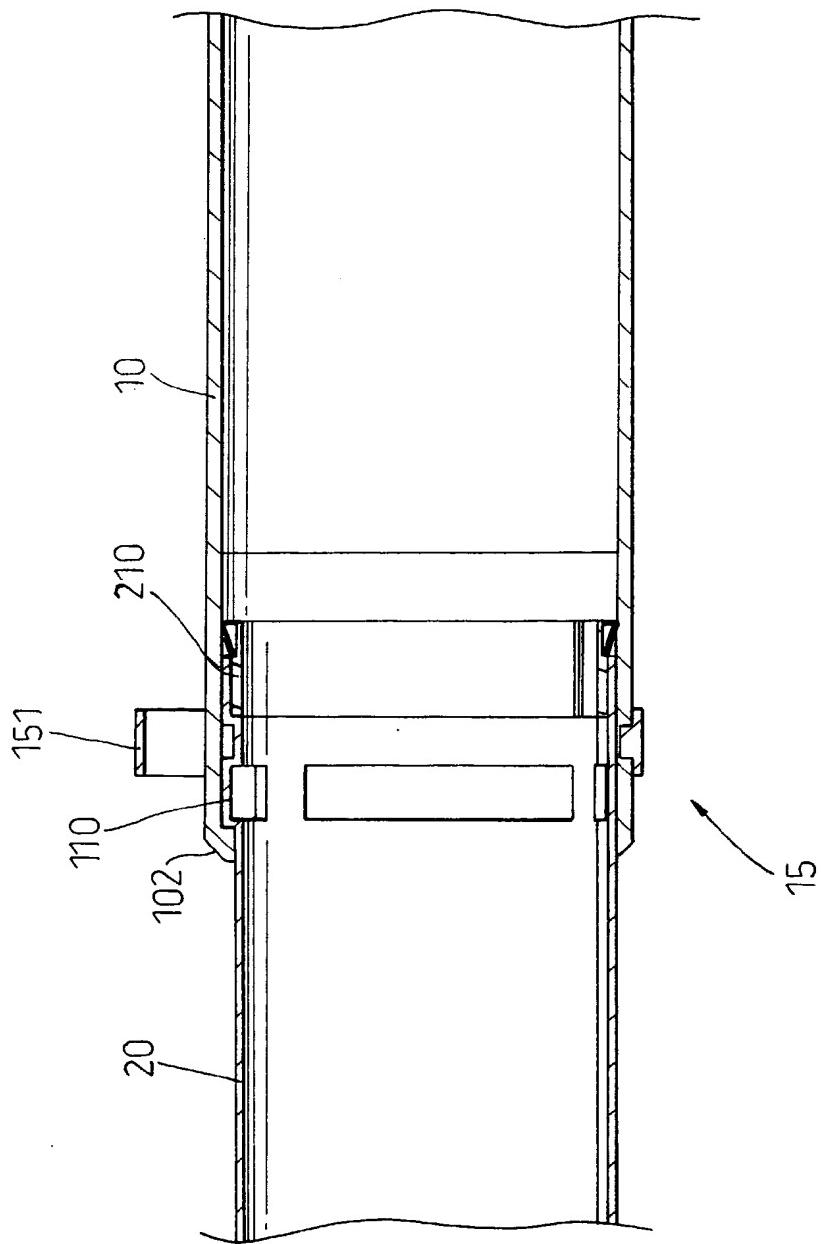


Fig. 6

6/12**Fig. 7**

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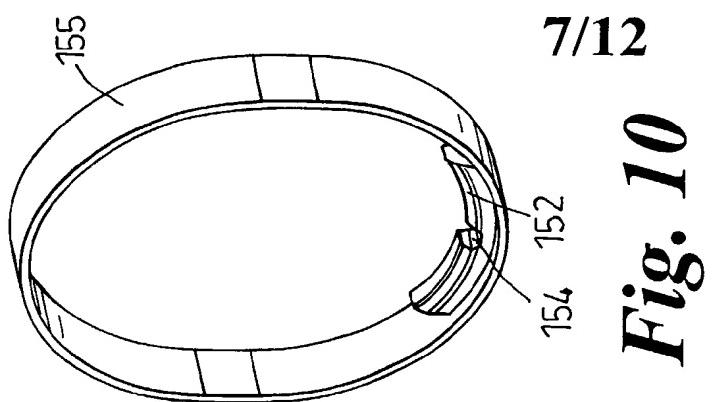
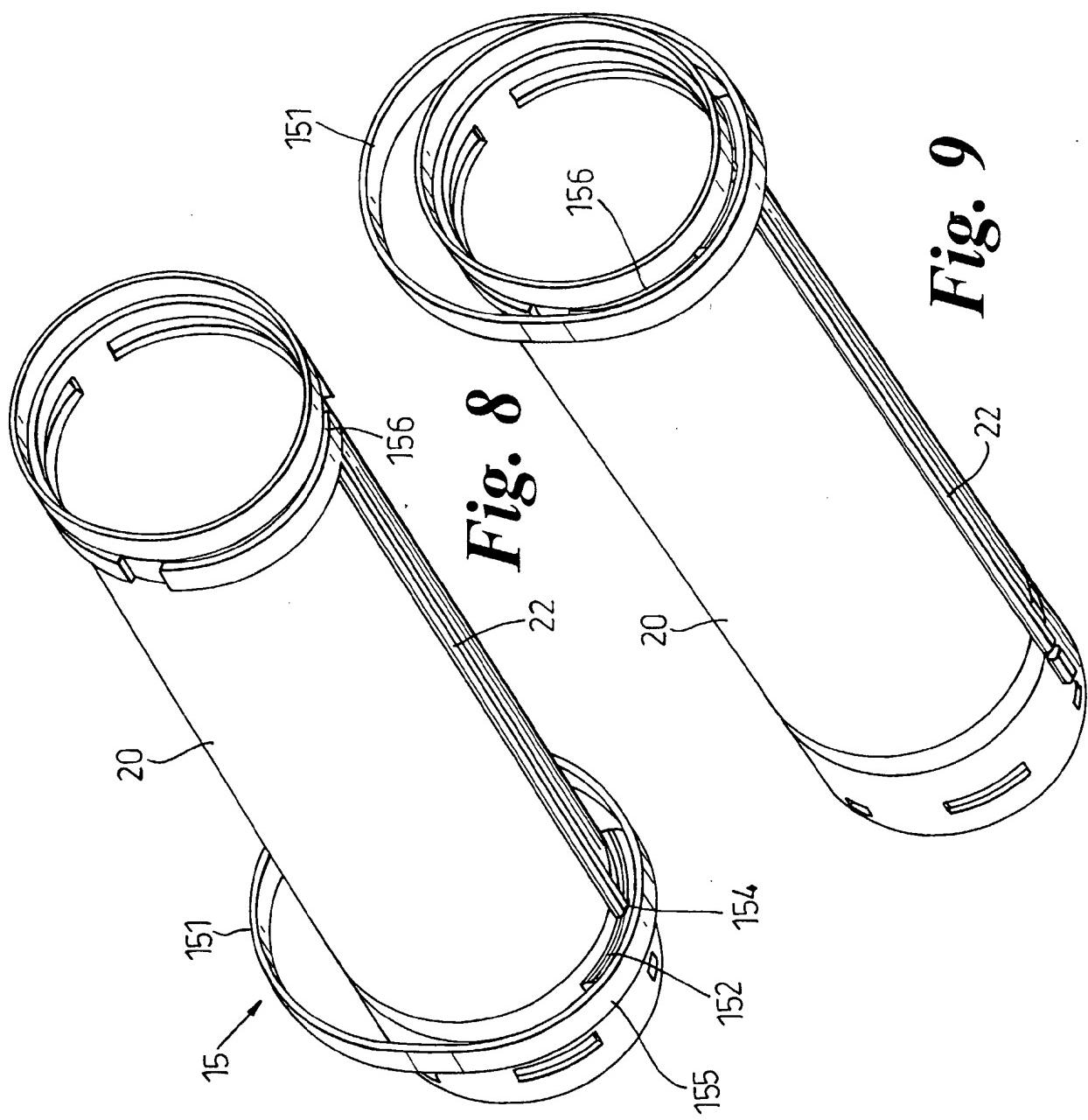


Fig. 10



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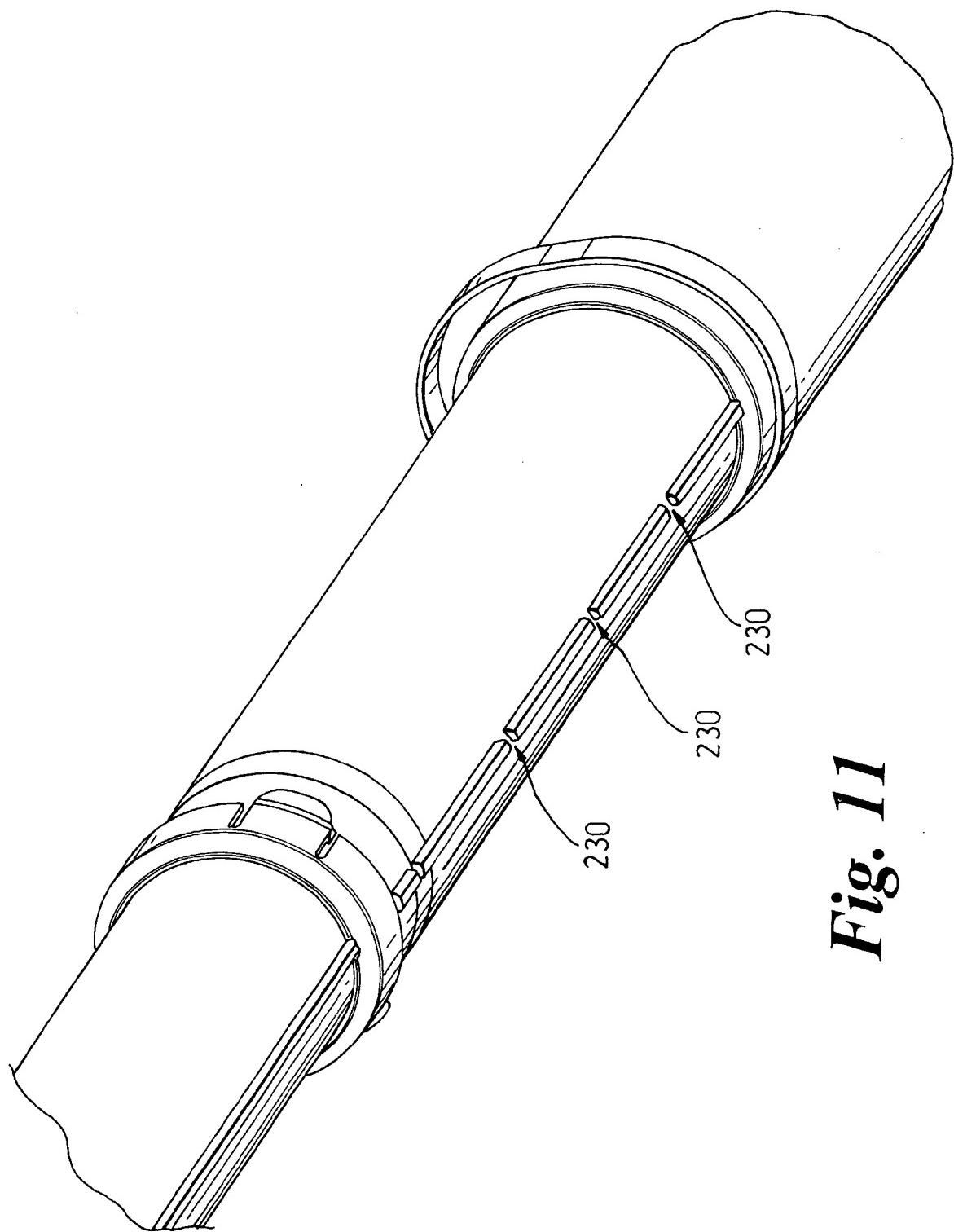


Fig. 11

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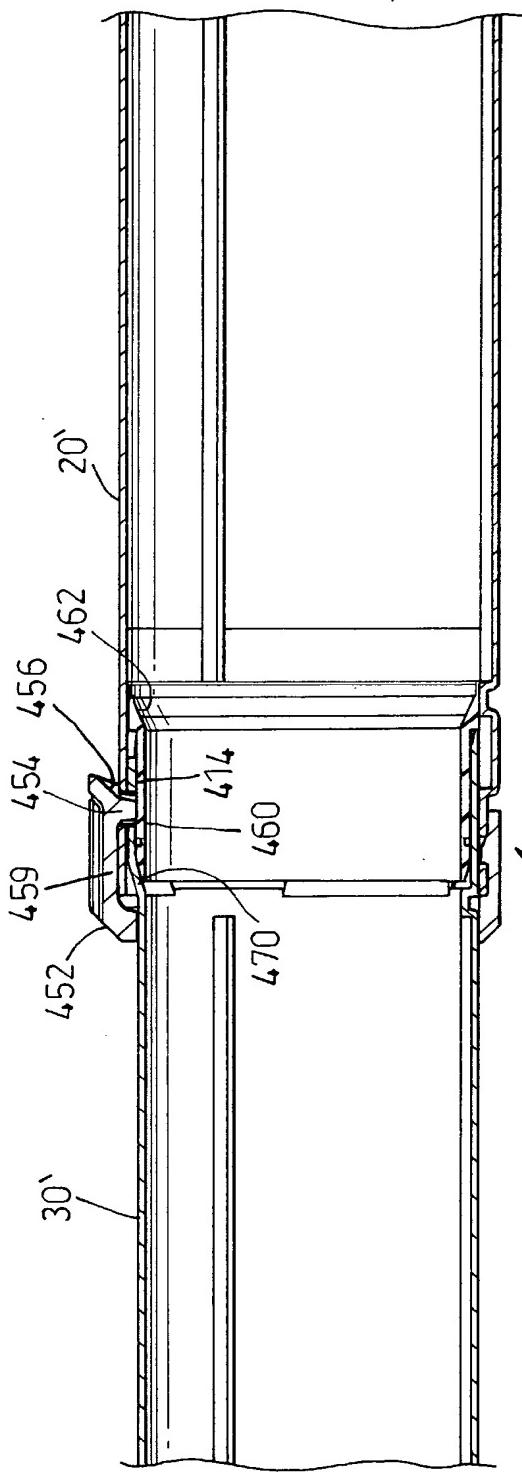


Fig. 12

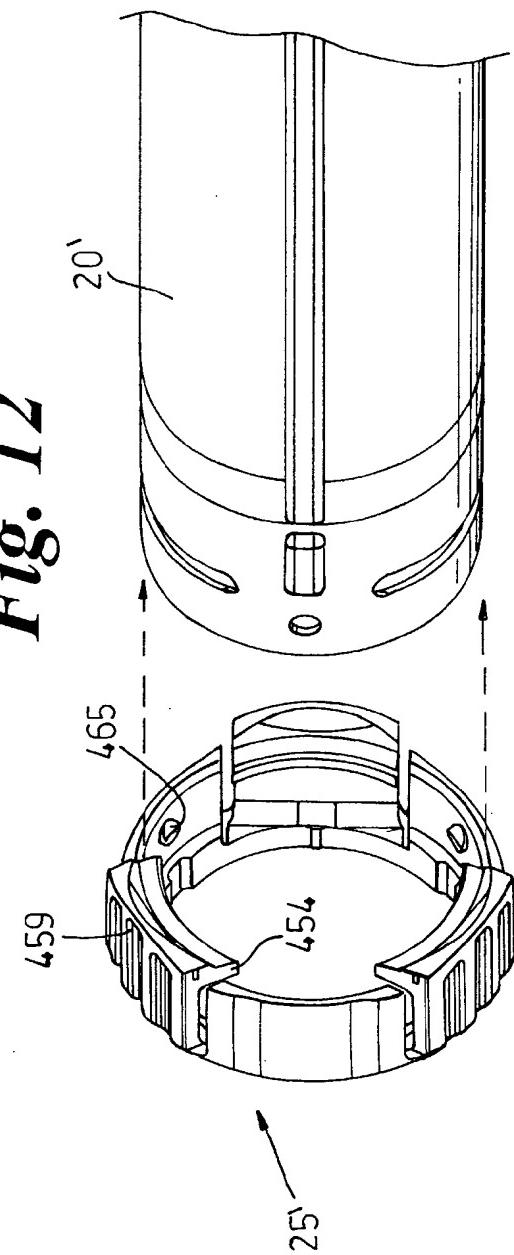
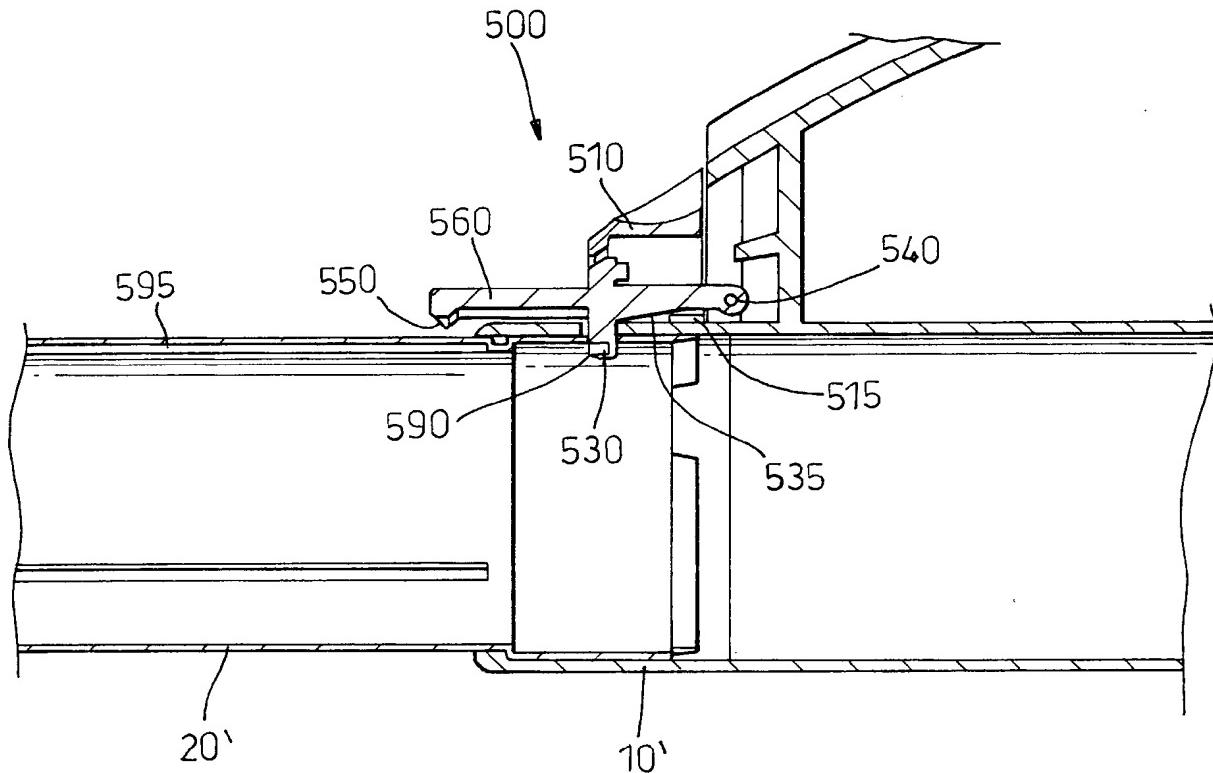
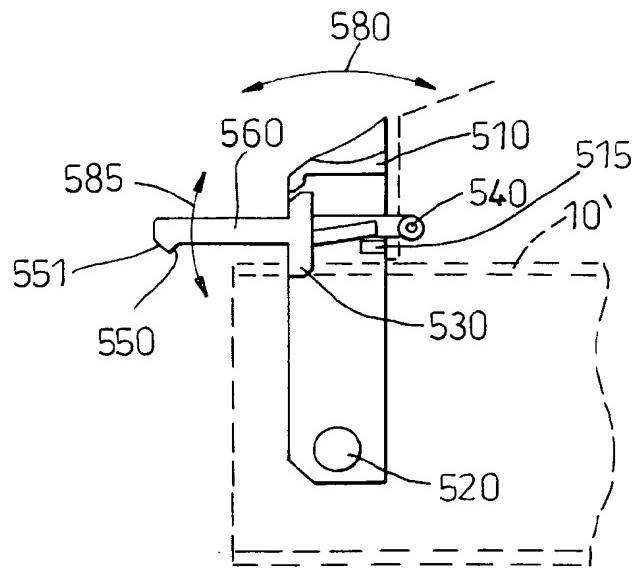


Fig. 13

10/12***Fig. 14******Fig. 15***

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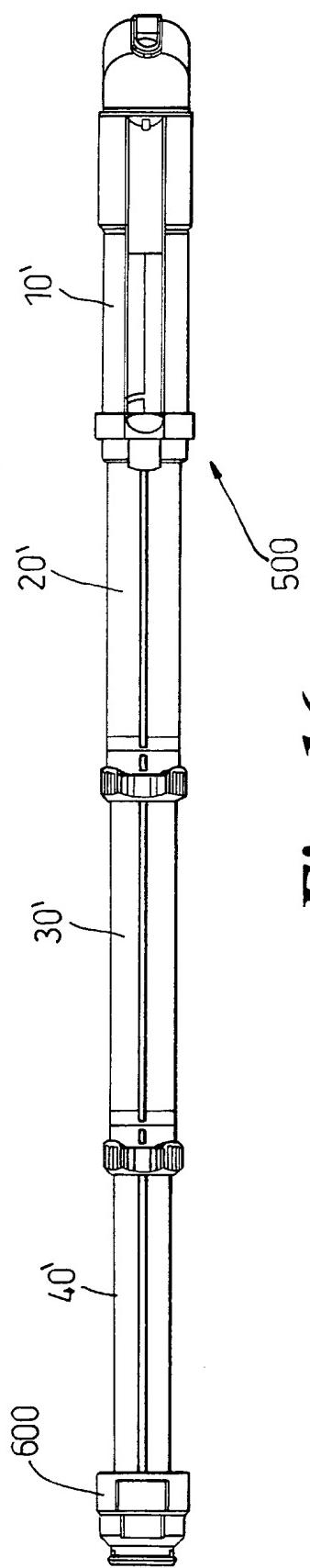


Fig. 16

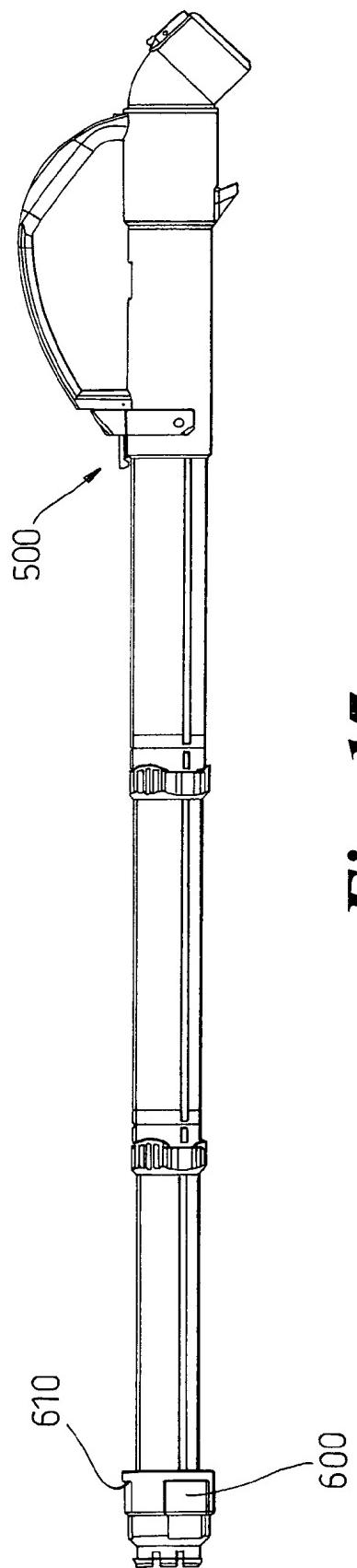


Fig. 17

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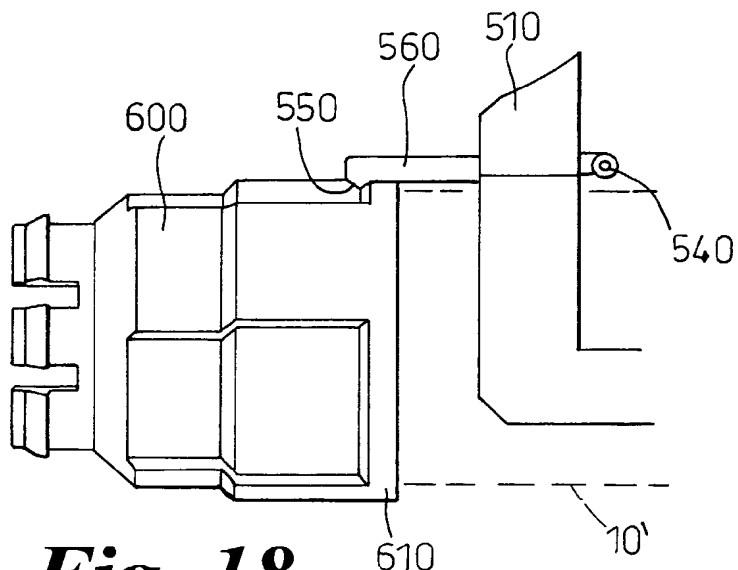


Fig. 18

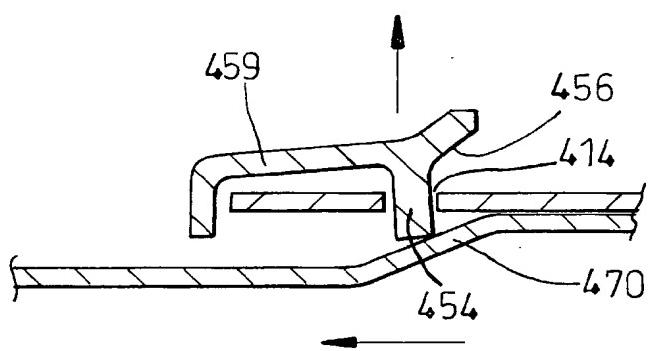


Fig. 19

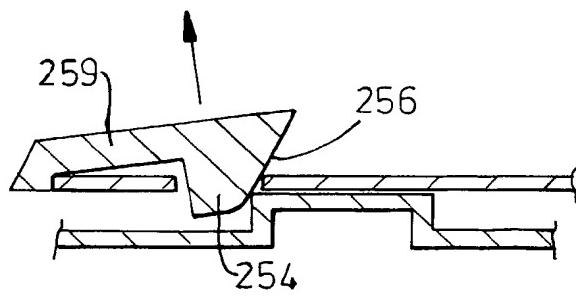


Fig. 20

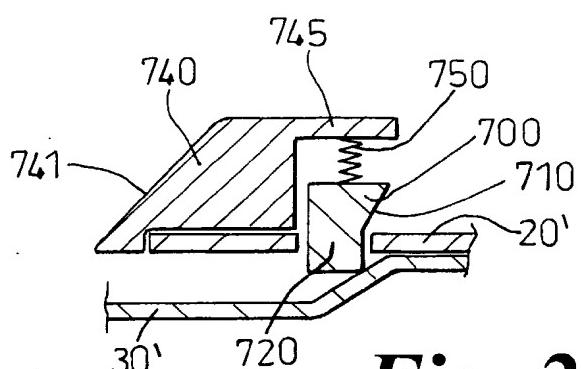


Fig. 21

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 02/00850

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A47L9/24

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A47L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 797 162 A (VYSTRCIL ROBERT A ET AL) 25 August 1998 (1998-08-25) column 5, line 22 – line 31 column 5, line 50 –column 6, line 23 column 8, line 42 – line 58 column 9, line 4 – line 11; figures 1,2,4,6,20,22,23	1-14, 18-20, 25-35, 41,42
Y	—	15-17, 21-23
X	US 6 032 328 A (WOOD STEVE ET AL) 7 March 2000 (2000-03-07) column 4, line 55 –column 5, line 3; figure 7	36,38,39
Y	—	21,22, 37,40
		-/-

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

° Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

*& document member of the same patent family

Date of the actual completion of the international search

26 April 2002

Date of mailing of the international search report

14/05/2002

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl.
Fax: (+31-70) 340-3016

Authorized officer

Papadimitriou, S

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 02/00850

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5 462 311 A (CIPOLLA MARK E) 31 October 1995 (1995-10-31) figure 2 ---	15-17
Y	US 6 154 918 A (CAIN BEATRICE ET AL) 5 December 2000 (2000-12-05) figure 2 ---	23
Y	US 3 083 041 A (STANLEY OWENMARK OLOV) 26 March 1963 (1963-03-26) column 3, line 6 – line 11; figures 2,3 -----	37, 40
A		24

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box I.2

Claims Nos.: 43

Claim 43 does not clearly and unambiguously set out the features of the wand. It merely makes a reference to the accompanying drawings. As such it fails to comply with the provisions of Article 6 PCT.

The applicant's attention is drawn to the fact that claims, or parts of claims, relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 02/00850

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
US 5797162	A 25-08-1998	US	6108861 A	29-08-2000
US 6032328	A 07-03-2000	NONE		
US 5462311	A 31-10-1995	NONE		
US 6154918	A 05-12-2000	NONE		
US 3083041	A 26-03-1963	DE FR GB NL NL	1199445 B 1187376 A 859475 A 104751 C 222551 A	26-08-1965 10-09-1959 25-01-1961